

CLAIMS:

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1. A method comprising:
obtaining information characterizing the color response of a display device
associated with a client residing on a computer network;
modifying a color image based on the information to improve the accuracy of
the color image when displayed on the display device; and
delivering the modified color image to the client via the computer network for
display on the display device.

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2. The method of claim 1, further comprising obtaining the information by
guiding the client through a color profiling process that profiles the color response of
the display device.

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3. The method of claim 2, further comprising guiding the client through the
color profiling process by delivering a series of instructional web pages to the client.

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4. The method of claim 2, wherein the color profiling process includes
estimating a gamma for the color response of the display device.

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5. The method of claim 2, wherein the color profiling process includes
estimating a gamma for the color response of each of the red, green and blue color
channels associated with the display device.

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6. The method of claim 2, wherein the color profiling process includes
estimating a black point associated with the display device.
7. The method of claim 2, wherein the color profiling process includes:
estimating the black point of the display device;
estimating a coarse gamma for the display device;

estimating a fine gamma for the display device based in part on the coarse gamma;
estimating the gray balance of the display device; and
generating a color profile based on the black point, the coarse gamma, the fine gamma, and the gray balance.

8. The method of claim 7, wherein estimating the black point of the display device includes:

displaying a first range of gray elements on the display device;
setting the contrast of the display device to maximum;
setting the brightness of the display device to maximum;
reducing the brightness of the display device until the darkest of the gray elements is barely visible;
selecting the gray element that is barely visible.

9. The method of claim 8, wherein estimating the coarse gamma includes:
displaying a second range of gray elements with a dithered approximately 50% gray background;

selecting the gray element that appears to most closely blend with the background; and
estimating a single coarse gamma for the red, green, and blue channels of the display device based on the gray level of the selected gray element.

10. The method of claim 9, wherein estimating the fine gamma includes:
displaying the selected gray element within a third range of gray elements with the dithered background, wherein the gray levels of the third range of gray elements are more closely spaced than the gray levels in the second range of gray elements and substantially centered about the gray level of the selected gray element;
selecting the gray element in the third range of gray elements that appears to most closely blend with the dithered background; and

estimating a single fine gamma for the red, green, and blue channels of the display device based on the gray level of the selected gray element in the third range of gray elements.

5 11. The method of claim 10, wherein estimating the gray balance includes: displaying the selected gray element from the third range of gray elements among a fourth range of red-, green-, and blue-shifted gray elements with the background;

10 selecting the gray element in the fourth range of gray elements that appears to most closely blend with the background; and

 estimating individual gammas for the red, green, and blue channels of the display device based on the gray level of the selected gray element in the fourth range of gray elements.

15 12. The method of claim 2, wherein the color profiling process includes: displaying a dark element and a darker element on the display device; setting the contrast and brightness of the display to maximum; reducing the brightness until the darker element is not visible; reducing the brightness until the dark element is barely visible;

20 displaying a first range of gray elements with a dithered approximately 50% gray background;

 selecting the gray element in the first range that appears to most closely blend with the dithered background; and

25 estimating the gamma of the display device based on the gray level of the selected gray element.

 13. The method of claim 12, wherein the color profiling process further includes:

30 display ranges of gray elements for the red, green, and blue color channels of the display device with dithered approximately 50% gray red, green and blue backgrounds;

selecting the red, green, and blue gray elements that appear to most closely
blend with the respective backgrounds; and
estimating individual gammas for the red, green, and blue color channels based
on the selected red, green, and blue gray elements.

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14. The method of claim 2, further comprising:
guiding the client through the color profiling process by delivering a series of
instructional web pages to the client;
obtaining the information by generating a web cookie based on results of the
10 color profiling process; and
transmitting the web cookie to a remote server in the computer network.

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15. The method of claim 14, wherein the remote server modifies the color
image based on the information.

16. The method of claim 14, wherein the remote server delivers the modified
color image to the client.

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17. The method of claim 1, further comprising transmitting the information
to a remote server in the computer network, the remote server modifying the color
images based on the information.

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18. The method of claim 1, further comprising transmitting the information
to a plurality of remote servers in the computer network, and modifying a plurality of
color images based on the information, wherein each of the remote servers modifies and
delivers at least one of the color images to the client.

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19. The method of claim 1, further comprising obtaining the information by
obtaining information characterizing the color responses of a plurality of display
devices associated with a plurality of clients residing on the computer network.

20. The method of claim 1, wherein the color image forms part of content received by the client from a remote server.

21. The method of claim 1, wherein the computer network is the world wide web, and the color image forms part of a web page received by the client from a web server residing on the computer network.

22. The method of claim 1, wherein the color image includes a plurality of color images stored on image servers residing on the computer network, and the color images form parts of web pages received by the client from web servers residing on the computer network, the image servers and web servers being distinct from one another.

23. The method of claim 1, further comprising modifying the color images before the delivery of the color images to the client.

24. The method of claim 1, further comprising:
transmitting a web page from a web server to the client, wherein the web page includes an image tag identifying the color image on a color image server residing on the computer network;
transmitting the information as part of a web cookie to the color image server, wherein the color image server modifies the color image based on the information; and
transmitting the color image from the color image server to the client.

25. The method of claim 1, further comprising:
transmitting a first web page from a color profile server to the client, the web page guiding the client through a color profiling process to obtain the information;
transmitting a second web page from a web server to the client, wherein the web page includes an image tag identifying the color image on a color image server residing on the network;
transmitting the information as part of a web cookie to the color image server, wherein the color image server modifies the color image based on the information; and

transmitting the color image form the color image server to the client.

26. A system comprising:

a web server residing on a computer network, the web server transmitting web
5 pages to remote clients residing on the computer network;

a color image server residing on the computer network, the color image server
transmitting color images referenced by the web pages to the clients for display on
display devices associated with the clients;

a color profile server residing on the computer network, the color profile server
10 guiding the clients through a color profiling process to obtain information
characterizing the color responses of the display devices associated with the clients; and

one or more color correction modules that modify the color images transmitted
by the color image server based on the information to improve the accuracy of the color
images when displayed on the respective display device.

27. The system of claim 26, wherein the one or more color correction
modules include a plurality of color correction modules, each of the color correction
modules being resident with one of the color image servers on the network.

28. The system of claim 26, wherein the color profile server delivers a series
20 of instructional web pages to the client.

29. The system of claim 26, wherein the color profiling process includes
estimating a gamma for the color response of each of the display devices.

30. The system of claim 26, wherein the color profiling process includes
estimating a gamma for the color response of each of the red, green and blue color
channels associated with each of the display devices.

31. The system of claim 26, wherein the color profiling process includes
30 estimating a black point associated with each of the display devices.

32. The system of claim 26, wherein the color profiling process includes:
estimating the black point of each of the display devices;
estimating a coarse gamma for each of the display devices;
5 estimating a fine gamma for each of the display devices based in part on the
coarse gamma;
estimating the gray balance of each of the display devices; and
generating a color profile based on the black point, the coarse gamma, the fine
gamma, and the gray balance.

33. The system of claim 32, wherein estimating the black point of each of
the display devices includes:

displaying a first range of gray elements on each of the display devices;
setting the contrast of each of the display devices to maximum;
15 setting the brightness of each of the display devices to maximum;
reducing the brightness of each of the display devices until the darkest of the
gray elements is barely visible;
selecting the gray element that is barely visible.

34. The system of claim 32, wherein estimating the coarse gamma includes:
displaying a second range of gray elements with a dithered approximately 50%
gray background;

selecting the gray element that appears to most closely blend with the
background; and

25 estimating a single coarse gamma for the red, green, and blue channels of each
of the display devices based on the gray level of the selected gray element.

35. The system of claim 34, wherein estimating the fine gamma includes:
displaying the selected gray element within a third range of gray elements with
30 the background, wherein the gray levels of the third range of gray elements are more

38. The system of claim 37, wherein the color profiling process further includes:

displaying ranges of gray elements for the red, green, and blue color channels of the display device with dithered approximately 50% gray red, green and blue backgrounds;

selecting the red, green, and blue gray elements that appear to most closely blend with the respective backgrounds; and

estimating individual gammas for the red, green, and blue color channels based on the selected red, green, and blue gray elements.

39. The system of claim 26, wherein the web pages generated by the color profile server, when executed by one of the clients, generates a web cookie based on results of the color profiling process, each of the clients transmitting the web cookie to one of remote servers for correction of the color images.

40. The system of claim 39, wherein the one or more color correction modules modify the color images based on the information in the web cookie.

41. The system of claim 40, wherein the color image server delivers the modified color images to the clients.

42. The system of claim 26, wherein the clients transmit the information to one or more of the color image servers, and the one or more color correction modules includes a plurality of color correction modules, each of the color correction modules being resident with one of the color image servers, wherein each of the color correction modules modifies the color images based on the information.

43. The system of claim 26, wherein the computer network is the world wide web.

44. A method comprising:

obtaining information characterizing the color response of a display device associated with a client residing on a computer network, wherein the information includes an indication of gamma and black point;
incorporating the information in a cookie;
transmitting the cookie with a request for a color image;
modifying the color image based on the information in the cookie to improve the accuracy of the color images when displayed on the display device; and
delivering the modified color image to the client for display on the display device.

45. The method of claim 44, further comprising obtaining the information by guiding the client through a color profiling process that profiles the color response of the display device, the color profiling process including delivery of a series of interactive, instructional pages to the client, wherein completion of the color profiling process requires no more than four clicks with a pointing device operated by a user associated with the client.

46. The method of claim 44, wherein the cookie includes a profiler cookie written to the client by a first server that obtains the information, and a subscriber cookie written to the client by a color image server that delivers the modified color image.

47. The method of claim 46, further comprising transferring at least some of the contents of the profiler cookie to the color image server, whereby the color image server writes the subscriber cookie to the client, the subscriber cookie being thereafter transferred to the color image server when the client requests delivery of images from the color image server.

48. A system comprising:
a web server residing on a computer network, the web server transmitting web pages to remote clients residing on the computer network;

estimating the black point of the display device;
estimating a coarse gamma for the display device;
estimating a fine gamma for the display device based in part on the coarse
gamma;
5 estimating the gray balance of the display device; and
generating a color profile based on the black point, the coarse gamma, the fine
gamma, and the gray balance.

53. The method of claim 52, wherein estimating the black point of the
10 display device includes:

displaying a first range of gray elements on the display device;
setting the contrast of the display device to maximum;
setting the brightness of the display device to maximum;
reducing the brightness of the display device until the darkest of the gray
15 elements is barely visible;
selecting the gray element that is barely visible.

54. The method of claim 53, wherein estimating the coarse gamma includes:
displaying a second range of gray elements with a dithered approximately 50%
20 gray background;

selecting the gray element that appears to most closely blend with the
background; and

estimating a single coarse gamma for the red, green, and blue channels of the
display device based on the gray level of the selected gray element.

55. The method of claim 52, wherein estimating the fine gamma includes:
displaying the selected gray element within a third range of gray elements with
the background, wherein the gray levels of the third range of gray elements are more
25 closely spaced than the gray levels in the second range of gray elements and
substantially centered about the gray level of the selected gray element;
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selecting the gray element in the third range of gray elements that appears to most closely blend with the background; and

estimating a single fine gamma for the red, green, and blue channels of the display device based on the gray level of the selected gray element in the third range of gray elements.

56. The method of claim 55, wherein estimating the gray balance includes: displaying the selected gray element from the third range of gray elements among a fourth range of red-, green-, and blue-shifted gray elements with the background;

selecting the gray element in the fourth range of gray elements that appears to most closely blend with the background; and

estimating individual gammas for the red, green, and blue channels of the display device based on the gray level of the selected gray element in the fourth range of gray elements.

57. The method of claim 56, wherein the fourth range of gray elements is represented as a two-dimensional array of the gray elements.

58. The method of claim 57, wherein the selected gray element from the third range of gray elements is represented centrally within the two-dimensional array of the gray elements.

59. The method of claim 52, further comprising using the coarse gamma as a starting point for estimating the fine gamma, and using the fine gamma as a starting point for estimating the gray balance.

60. A computer readable medium containing program code that, upon execution by a processor:

obtains information characterizing the color response of a display device associated with a client computer residing on a computer network;

modifies a color image based on the information to improve the accuracy of the color images when displayed on the display device; and
delivers the modified color image to the client for display on the display device.

5 61. The computer readable medium of claim 60, wherein the program code is contained both in physical data storage media and signals transmitted between the client computer and other resource on the computer network.

10 62. A computer readable medium containing program code that, upon execution by processor:
 requests a color image from a remote server;
 transmits to the remote server information characterizing the color response of a display device associated with a client residing on a computer network; and
 receives from the remote server the requested color image following
15 modification of the color image by the remote server based on the information.

20 63. The computer readable medium of claim 62, wherein the program code is contained both in physical data storage media and signals transmitted between the client computer and other resource on the computer network.

25 64. A web cookie data structure encoded in a computer-readable medium, the data structure, upon processing by a processor:
 presents a first field indicating a web domain;
 presents a second field indicating a black point of a display device associated with a client residing on a computer network; and
 presents a third field indicating a gamma of the display device.